AP STAT: Ch. 6-8 **NAMES:** Key

Inference learned so far:

- 1 sample Z test
- 1 sample t-test (and matched pairs)
- 2 sample t-test (and pooled 2-sample)
- 1 proportion z-test
- 2 proportion z-test

Directions:

- Write down the important info given
- Decide if you are testing means or proportions
- Determine one-sample or two-sample
- Decide which test/interval to use and WRITE THE NAME OF THE TEST/INTERVAL
- State and check the assumptions
- (if it is a test) Write the hypothesis
- Write out the test statistic formula or the confidence interval formula

1. A manufacturer wishes to compare the wearing qualities of two different types of automobile tires, A and B. For the comparison, a tire of type A and one of type B are randomly assigned and mounted on the rear wheels of each of five automobiles. The cars are then operated for a specified number of miles, and the amount of wear is recorded for each tire.

		1	2	3	4	5
L_1	A	10.6	9.8	12.3	9.7	8.8
L_2	B	10.2	9.4	11.8	9.1	8.3

$L_3 = L_2 - L_1$

Do the data present sufficient evidence to indicate a difference in the average wear for the two tire types? Test using α = .05.

1 sample t-test for matched pairs

$H_0: \mu_d = 0$

$H_a: \mu_d \neq 0$

$$t = \frac{\bar{x}_d - \mu_d}{s_d/\sqrt{n_d}}$$

L_3

$\bar{x}_d = -0.68$

$s_d = 0.0837$

$n = 5$

$df = 4$

$\alpha = 0.05$

State

1) SRS

2) norm. pop of diff.
or
$n_d \geq 30$

Check

1) assumed

2) assumed normal

2. A local chamber of commerce claims that the mean family income level in a city is \$12,250. An economist takes a sample of 135 families, and finds a mean of \$11,500. He knows the population standard deviation is \$3180. Should the \$12,250 claim be rejected at a 5% level of significance?

$\mu = 12{,}250$
$n = 135$
$\bar{x} = 11500$
$\sigma = 3180$
$\alpha = 0.05$

1 sample z test for μ

$H_0: \mu = 12250$
$H_a: \mu \neq 12250$

State
1) SRS
2) σ known
3) norm pop or $n \geq 30$

Check
1) assumed
2) $\sigma = 3180$
3) $n = 135 \geq 30$ ✓

$z = \dfrac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

3. It has been claimed that more than 40 percent of all shoppers can identify a highly advertised trademark. If 20 of 36 shoppers were able to identify the trademark, test the claim at the 0.01 level of significance.

$p > 0.40$
$\hat{p} = \frac{20}{36}$
$\alpha = 0.01$

1 prop z test

$H_0: p = 0.40$
$H_a: p > 0.40$

$z = \dfrac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$

State
1) SRS
2) np, $n(1-p) \geq 10$
3) pop $\geq 10 \cdot n$

Check
1) assumed
2) $(36)(0.4)$, $(36)(0.6)$ ≥ 10 ✓
3) pop $\geq 10(36)$ ✓

4. Sample surveys conducted in a large county in 1978 and again 20 years later produced the data in the table concerning the average height (in inches) of ten-year-old boys. Do the data provide sufficient evidence to indicate that the mean heights have increased? Use $\alpha = 0.1$. There is evidence to believe that the two populations have the same std. deviation.

	n	$\bar{x}$	s
1978	400	53.8	2.4
1998	500	54.5	2.5

2 sample t test for μ pooled

$\alpha = 0.01$ $\quad df = 898$

$H_0: \mu_{78} = \mu_{98}$
$H_a: \mu_{78} < \mu_{98}$

$t = \dfrac{\bar{X}_{78} - \bar{X}_{98}}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} =$

State
1) 2 indep SRS
2) 2 normal pops or $n_1, n_2 \geq 30$
3) $\sigma_1 = \sigma_2$

Check
1) assumed
2) 500, 400 ≥ 30 ✓
3) stated

5. Joe claimed the probability that a commuting college student has car trouble of some type on the way to college in the morning is greater than the probability that the student will have car trouble on the way to work or home after class. The Sports Car Club thinks that the ideas of "before class" and "after class" have nothing to do with whether or not a student has car trouble. The club decides to challenge Joe's claim. Test the hypothesis at the 0.02 level of significance given the following data.

Sample	# with Trouble	# Sampled
Before	30	500
After	28	600

2 prop z test

$\hat{p}_B = 30/500$

$\hat{p}_A = 28/600$

$\alpha = 0.02$

$H_0: p_B = p_A$

$H_a: p_B > p_A$

$$z = \frac{\hat{p}_B - \hat{p}_A}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_A} + \frac{1}{n_B}\right)}}$$

State

1) 2 indep SRS

2) $n_1 p_1$, $n_1(1-p_1)$, $n_2 p_2$, $n_2(1-p_2)$ ≥ 10

3) $pop_1 \geq 10 \cdot n_1$, $pop_2 \geq 10 \cdot n_2$

Check

1) assumed

2) 30, 470, 28, 572 ≥ 10 ✓

3) pop ≥ 5000, pop ≥ 6000

6. A random sample of size 20 is taken from the weights of babies born at Northside Hospital during this past year. A mean of 6.87 lb and a standard deviation of 1.76 lb were found for the sample. Based on previous studies, the mean weight of babies is known to be 7.2 lbs. Perform a test to see if the mean weight of babies is now less than 7.2 lbs. (It is assumed from past experience that the weights of newborns are normally distributed.)

1 sample t test

$n = 20$

$\bar{x} = 6.87$

$s = 1.76$

$\mu = 7.2$

$\alpha = 0.05$

$df = 19$

$H_0: \mu = 7.2$

$H_a: \mu < 7.2$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} =$$

State

1) SRS

2) norm. pop. or $n \geq 30$

Check

1) circled

2) stated normal